

## ABSTRACT

### FREENESS AND DISCRETENESS OF ACTIONS ON R-TREES BY FINITELY GENERATED FREE GROUPS

LI LEE

In this thesis, we investigate minimal actions of a finitely generated free group  $G$  on an  $\mathbb{R}$ -tree  $T$ . We express  $G$  as a free product of two subgroups  $G = G' * G''$ . Assuming that the induced action of  $G'$  and  $G''$  on their minimal invariant subtrees are free and discrete, we study the freeness and discreteness of the action  $T \times G \rightarrow T$  under various conditions.

In Chapter 2, we introduce Condition A and give an equivalent form Condition A'. We then show that Condition A is a kind of 'freeness' condition. When we consider the question of whether the freeness implies the discreteness for an action of a finitely generated free group on an  $\mathbb{R}$ -tree, Condition A plays an important role, without this condition there is a counterexample, on the other hand, we feel that Condition A implies the discreteness of the action when we assume its freeness. In this thesis, we try to prove this in some cases. The idea is to study the intersection  $T_0$  of the minimal invariant subtrees of  $G'$  and  $G''$ , and the action on  $T_0$  of the pseudo group of partial isometries of  $T_0$  induced by elements of  $G$ . The freeness and the discreteness of the action of  $G$  on  $T$  depends on that of the action of the above pseudo group on  $T_0$ .

Beginning from Chapter 5, we concentrate on minimal actions of the free group of rank 3 on  $\mathbb{R}$ -trees satisfying Condition A and give more examples of when the freeness of an action implies its discreteness and when the action is not free.